

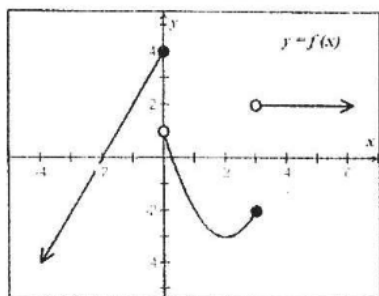
Calculus Limits Workbook

Understanding the Limit Form A

Name _____

Date _____ Period _____

Use the graph below to find the limits.



1. $\lim_{x \rightarrow 0^-} f(x) =$

4

2. $\lim_{x \rightarrow 0^+} f(x) =$

1

3. $\lim_{x \rightarrow 3^+} f(x) =$

2

4. $\lim_{x \rightarrow 3^-} f(x) =$

-2

5. $\lim_{x \rightarrow \infty} f(x) =$

2

6. $\lim_{x \rightarrow -\infty} f(x) =$

-∞

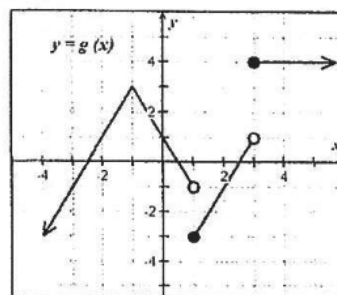
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Understanding the Limit Form B

Name _____

Date _____ Period _____

Use the graph below to find the limits.



1. $\lim_{x \rightarrow 1^-} g(x) =$

2. $\lim_{x \rightarrow 1^+} g(x) =$

3. $\lim_{x \rightarrow \infty} g(x) =$

4. $\lim_{x \rightarrow 3} g(x) =$

5. $\lim_{x \rightarrow -1} g(x) =$

6. $\lim_{x \rightarrow -\infty} g(x) =$

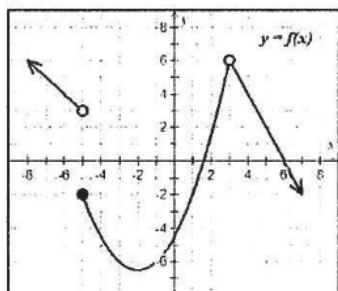
Jean Adams

Understanding the Limit Form C

Name _____

Date _____ Period _____

Use the graph below to find the limits.



1. $\lim_{x \rightarrow -5^+} f(x) =$

2. $\lim_{x \rightarrow -5^-} f(x) =$

3. $\lim_{x \rightarrow 3} f(x) =$

4. $\lim_{x \rightarrow \infty} f(x) =$

5. $\lim_{x \rightarrow -\infty} f(x) =$

6. $\lim_{x \rightarrow -5} f(x) =$

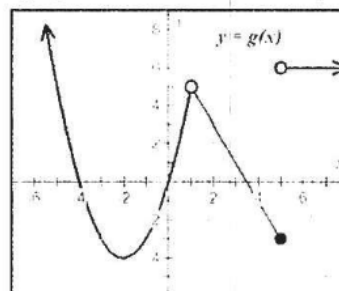
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Understanding the Limit Form D

Name _____

Date _____ Period _____

Use the graph below to find the limits.



1. $\lim_{x \rightarrow 1^+} g(x) =$

2. $\lim_{x \rightarrow 5^-} g(x) =$

3. $\lim_{x \rightarrow 5^+} g(x) =$

4. $\lim_{x \rightarrow \infty} g(x) =$

5. $\lim_{x \rightarrow -\infty} g(x) =$

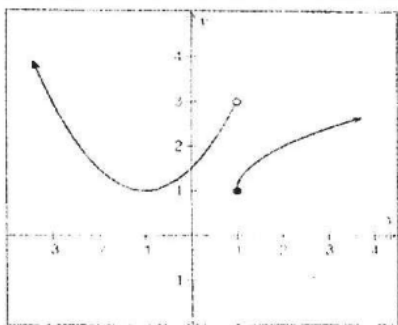
6. $\lim_{x \rightarrow 1} g(x) =$

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Finding Limits Analytically Form A

Name _____

Date _____ Period _____



1. In the graph shown above, find the limits.

$$\lim_{x \rightarrow -1^+} f(x) = 1$$

$$\lim_{x \rightarrow -1^-} f(x) = 3$$

2. $\lim_{x \rightarrow -\infty} \left(\frac{3}{x+4} \right) =$

0

3. $\lim_{x \rightarrow 5} \left(\frac{7x}{x-5} \right) =$

DNE

4. $\lim_{x \rightarrow -3} \left(\frac{x^2 + 4x + 3}{x^2 - 3} \right) =$

$$\frac{0}{6} \quad 0$$

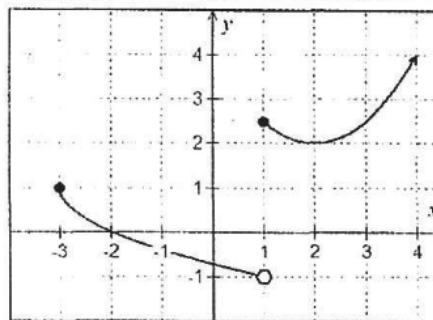
5. $\lim_{x \rightarrow 2} \sqrt{x+3} =$

$$\sqrt{5}$$

Finding Limits Analytically Form B

Name _____

Date _____ Period _____



1. In the graph shown above, find the limits.

$$\lim_{x \rightarrow 1^+} f(x) =$$

$$\lim_{x \rightarrow 1^-} f(x) =$$

2. $\lim_{x \rightarrow 2} \left(\frac{2x}{x-2} \right) =$

3. $\lim_{x \rightarrow \infty} \left(\frac{6}{x-3} \right) =$

4. $\lim_{x \rightarrow 0^-} \frac{|x-3|}{x} =$

5. $\lim_{x \rightarrow -3} \left(\frac{x^2 + 5x + 6}{x+3} \right) =$

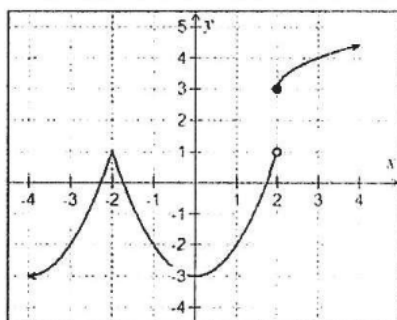
$$\frac{(x+3)(x+2)}{x+3} = x+2$$

$$-1$$

Finding Limits Analytically Form C

Name _____

Date _____ Period _____



1. In the graph shown above, find the limits.

$$\lim_{x \rightarrow 2^+} f(x) =$$

$$\lim_{x \rightarrow 2^-} f(x) =$$

$$2. \lim_{x \rightarrow 8} \sqrt{2x-7} =$$

$$3. \lim_{x \rightarrow -4} \left(\frac{x+4}{x^2-16} \right) =$$

$$4. \lim_{x \rightarrow 2} \left(\frac{x^2 - 4x + 4}{x^2 - 4} \right) =$$

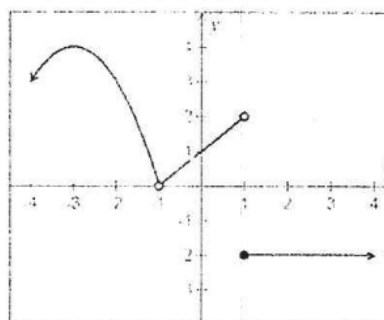
$$5. \lim_{x \rightarrow 0^+} \frac{|x-4|}{x} =$$

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Finding Limits Analytically Form D

Name _____

Date _____ Period _____



1. In the graph shown above, find the limits.

$$\lim_{x \rightarrow 1^+} f(x) =$$

$$\lim_{x \rightarrow 1^-} f(x) =$$

$$2. \lim_{x \rightarrow 4} \left(\frac{6x}{x-4} \right) =$$

$$3. \lim_{x \rightarrow 5} \sqrt{9-x} =$$

$$4. \lim_{x \rightarrow 0^+} \frac{|x-2|}{x} =$$

$$5. \lim_{x \rightarrow 3} \left(\frac{x^2 + 6x - 27}{x-3} \right) =$$

Properties of Limits Form A

Name _____

Date _____ Period _____

Questions 1 - 5: Use the information in the table below to evaluate each limit.

x	-1	0	1	2	3
$f(x)$	6	-5	-3	-1	0
$g(x)$	-8	2	1	-4	2

1. $\lim_{x \rightarrow 1} [f(x) - 4g(x)]$

$$f(1) - 4g(1)$$

$$-3 - 4(1)$$

$$\boxed{-7}$$

2. $\lim_{x \rightarrow -1} \frac{2f(x) + 3g(x)}{g(x) - f(x)}$

3. $\lim_{x \rightarrow 0} \frac{[3g(x)]^2}{4 - f(x)}$

4. $\lim_{x \rightarrow 3} [g(x) \cdot (f(x) + 8)]$

5. $\lim_{x \rightarrow 2} \sqrt{4 - 2g(x)}$

Grade:

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Properties of Limits Form B

Name _____

Date _____ Period _____

Questions 1 - 5: Use the information in the table below to evaluate each limit.

x	-1	0	1	2	3
$f(x)$	8	-3	-5	2	6
$g(x)$	-6	3	4	0	-1

1. $\lim_{x \rightarrow 1} [f(x) - 3g(x)]$

2. $\lim_{x \rightarrow -1} \frac{3f(x) + 2g(x)}{g(x) - f(x)}$

3. $\lim_{x \rightarrow 0} \frac{[2g(x)]^2}{3 - f(x)}$

4. $\lim_{x \rightarrow 2} [g(x) \cdot (f(x) + 7)]$

5. $\lim_{x \rightarrow 3} \sqrt{2g(x) + 3f(x)}$

Grade:

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Properties of Limits Form C						
Name _____						
Date _____ Period _____						
Questions 1 - 4: Use the information in the table below to evaluate each limit.						
x	-2	-1	0	1	2	
$f(x)$	5	-2	-6	3	4	
$g(x)$	-4	-6	3	0	5	
1. $\lim_{x \rightarrow 2} [g(x) + 3f(x)]$						
2. $\lim_{x \rightarrow -1} \frac{4f(x) - 3g(x)}{f(x) - g(x)}$						
3. $\lim_{x \rightarrow 0} \frac{[2g(x)]^2}{3 - f(x)}$						
4. $\lim_{x \rightarrow 1} [f(x) \cdot (g(x) + 5)]$						
5. $\lim_{x \rightarrow -2} \sqrt{4 - 3g(x)}$						
Grade: _____						

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Properties of Limits Form D						
Name _____						
Date _____ Period _____						
Questions 1 - 4: Use the information in the table below to evaluate each limit.						
x	-2	-1	0	1	2	
$f(x)$	4	6	-2	0	3	
$g(x)$	6	-3	2	5	-4	
1. $\lim_{x \rightarrow 2} [g(x) + 2f(x)]$						
2. $\lim_{x \rightarrow -1} \frac{3f(x) - 2g(x)}{f(x) - g(x)}$						
3. $\lim_{x \rightarrow 0} \frac{[3g(x)]^2}{4 - f(x)}$						
4. $\lim_{x \rightarrow 1} [g(x) \cdot (f(x) + 3)]$						
5. $\lim_{x \rightarrow -2} \sqrt{2g(x) - f(x)}$						
Grade: _____						

Limits of Transcendental Functions Form A	
Name _____	
Date _____	Period _____
1. $\lim_{x \rightarrow -3} [2^{x+5} - 3]$ $\begin{array}{l} -3+5 \\ 2 \quad -3 \\ 2^2 -3 \end{array} \rightarrow 1$	
2. $\lim_{x \rightarrow 2} \left(\frac{1}{3}\right)^{x-2} - 4$ $\left(\frac{1}{3}\right)^{2-2} - 4 = 1 - 4 = \boxed{-3}$	
3. $\lim_{x \rightarrow \infty} 2^{x+2} + 1$ ∞	
4. $\lim_{x \rightarrow \pi} e^x \cos x$ $\begin{array}{l} e^\pi \cdot \cos \pi \\ e^\pi \cdot (-1) \end{array} \rightarrow \boxed{-e^\pi}$	
5. $\lim_{x \rightarrow 2} e^{x-3} + 2$ $e^{2-3} + 2 \Rightarrow e^{-1} + 2 = \boxed{\frac{1}{e} + 2}$	
Grade: _____	

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Limits of Transcendental Functions Form B	
Name _____	
Date _____	Period _____
1. $\lim_{x \rightarrow -2} [2^{x+3} + 5]$	
2. $\lim_{x \rightarrow 3} \left(\frac{1}{2}\right)^{x-4} - 3$	
3. $\lim_{x \rightarrow \infty} 3^{x-4} + 2$	
4. $\lim_{x \rightarrow \frac{\pi}{2}} e^x \sin x$	
5. $\lim_{x \rightarrow 1} e^{x-2} + 2$	
Grade: _____	

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Limits of Transcendental Functions Form C	
Name _____	
Date _____	Period _____
1. $\lim_{x \rightarrow 2} [3^{4-x} + 4]$	
2. $\lim_{x \rightarrow -1} \left(\frac{1}{2}\right)^{x-2} - 3$	
3. $\lim_{x \rightarrow -\infty} 3^{x+1} + 2$	
4. $\lim_{x \rightarrow 0} e^x \sec x$	
5. $\lim_{x \rightarrow -2} e^{x+3} + 1$	
Grade: _____	

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Limits of Transcendental Functions Form D	
Name _____	
Date _____	Period _____
1. $\lim_{x \rightarrow 4} [3^{6-x} + 2]$	
2. $\lim_{x \rightarrow -2} \left(\frac{1}{4}\right)^{x+1} + 3$	
3. $\lim_{x \rightarrow -\infty} 2^{x-2} + 4$	
4. $\lim_{x \rightarrow \pi} e^x \csc x$	
5. $\lim_{x \rightarrow -1} e^{x+1} + 2$	
Grade: _____	

Limits & Continuity Form A

Name _____

Date _____ Period _____

Given: $f(x) = \frac{x-1}{x^2+x-2}$ ~~$\frac{x-1}{(x+2)(x-1)}$~~

1. Find all the values at which f is not continuous.

$$(x^2+x-2)=0$$

$$(x+2)(x-1)=0$$

$$x=-2 \quad x=1$$

2. For each discontinuity, state whether they are removable or non-removable.

(hole) $x=1$
(asymptote) $x=-2$

Given: $f(x) = \begin{cases} \frac{x^2-9}{x-3}, & x \neq 3 \\ k, & x = 3 \end{cases}$

3. What value of k would make $f(x)$ continuous at $x=3$?

$$\frac{x^2-9}{x-3} = \frac{(x+3)(x-3)}{x-3} = x+3$$

$$3+3 = \boxed{6}$$

4. State the ordered pair at the transition point where the function becomes continuous.

$(3, 6)$

what point fills hole

5. Use the conditions of continuity to explain why f is continuous.

$$\lim_{x \rightarrow 3^+} f(x) = \lim_{x \rightarrow 3^-} f(x)$$

$$f(3) = 6 \quad \checkmark$$

$$\lim_{x \rightarrow 3} f(x) = 6 \quad \checkmark$$

$$\lim_{x \rightarrow 3} f(x) = f(x)$$

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Limits & Continuity Form B

Name _____

Date _____ Period _____

Given: $f(x) = \frac{x^2+2x-8}{x-2}$

1. Find all the values at which f is not continuous.

2. For each discontinuity, state whether they are removable or non-removable.

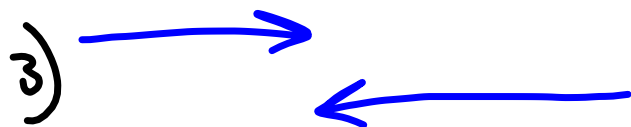
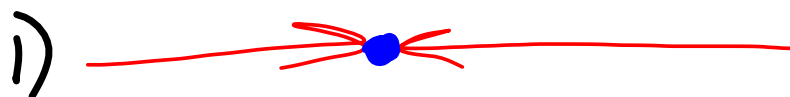
Given: $g(x) = \begin{cases} 9-x^2, & x < 2 \\ kx, & x \geq 2 \end{cases}$

3. What value of k would make $f(x)$ continuous at $x=2$?

4. State the ordered pair at the transition point where the function becomes continuous.

5. Use the conditions of continuity to explain why f is continuous.

Jean Adams



Limits & Continuity Form C	
Name _____	
Date _____	Period _____
Given: $f(x) = \frac{x-5}{x^2-3x-10}$	
1. Find all the values at which f is not continuous.	
2. For each discontinuity, state whether they are removable or non-removable.	
Given: $f(x) = \begin{cases} 3 - x^2, & x < 2 \\ kx - 5, & x \geq 2 \end{cases}$	
3. What value of k would make $f(x)$ continuous at $x = 2$?	
4. State the ordered pair at the transition point where the function becomes continuous.	
5. Use the conditions of continuity to explain why f is continuous.	

Limits & Continuity Form D	
Name _____	
Date _____	Period _____
Given: $f(x) = \frac{x+3}{x^2+2x-3}$	
1. Find all the values at which f is not continuous.	
2. For each discontinuity, state whether they are removable or non-removable.	
Given: $f(x) = \begin{cases} \frac{x^2-1}{x-1}, & x \neq 1 \\ k, & x = 1 \end{cases}$	
3. What value of k would make $f(x)$ continuous at $x = 1$?	
4. State the ordered pair at the transition point where the function becomes continuous.	
5. Use the conditions of continuity to explain why f is continuous.	

$$N > D \quad \pm \infty$$

$$D > N \quad 0$$

$$N = D \quad \text{coefficients}$$

Limits At Infinity	Form A	Limits At Infinity	Form B
Name _____	Name _____	Name _____	Name _____
Date _____ Period _____	Date _____ Period _____	Date _____ Period _____	Date _____ Period _____
1. Use the End Behavior Model method to find $\lim_{x \rightarrow \infty} \left(\frac{3-2x}{3x^2-1} \right)$ <u>Degree 1</u> <u>Degree 3</u> bottom heavy $\lim = \boxed{0}$		1. Use the End Behavior Model method to find $\lim_{x \rightarrow \infty} \left(\frac{3-2x}{5x-4} \right)$	
2. Find $\lim_{x \rightarrow \infty} \frac{\sqrt{x^4-1}}{-2x^2}$ <u>Degree 2</u> <u>Degree 2</u> coefficients $\sqrt{x^4} = x^2$ $\frac{\sqrt{1}}{-2} = \boxed{-\frac{1}{2}}$		2. Find $\lim_{x \rightarrow \infty} \frac{\sqrt{x^2+x}}{-2x}$	
3. Find $\lim_{x \rightarrow \infty} \frac{\sqrt{6-x}}{1}$ $\frac{\sqrt{6-x}}{1} = \frac{\text{Degree } \frac{1}{2}}{\text{Degree } 0}$ Top heavy $\boxed{\infty}$		3. Find $\lim_{x \rightarrow \infty} \frac{4 \cos x}{x}$	
4. Find $\lim_{x \rightarrow \infty} \frac{x - \sin 2x}{2x} = \frac{x}{2x} - \frac{\sin 2x}{2x}$ $\lim_{x \rightarrow \infty} \left(\frac{x}{2x} \right) - \lim_{x \rightarrow \infty} \frac{\sin 2x}{2x}$ $\frac{1}{2} - 0 = \boxed{\frac{1}{2}}$		4. Find $\lim_{x \rightarrow \infty} (3 - 2x - 4x^5)$	

Limits At Infinity Form C	Limits At Infinity Form D
Name _____ Date _____ Period _____	Name _____ Date _____ Period _____
1. Use the End Behavior Model method to find $\lim_{x \rightarrow \infty} \frac{5-2x^{3/2}}{3x-4}$	1. Use the End Behavior Model method to find $\lim_{x \rightarrow \infty} \frac{5x^{3/2}}{4\sqrt{x}+3}$
2. Find $\lim_{x \rightarrow -\infty} \frac{\sqrt{x^4-1}}{x^2-1}$	2. Find $\lim_{x \rightarrow -\infty} \frac{4x^3+1}{8x^3-5x^2+7}$
3. Find $\lim_{x \rightarrow \infty} \frac{x-\cos x}{x}$	3. Find $\lim_{x \rightarrow \infty} (7-4x^2-2x^3)$
4. Find $\lim_{x \rightarrow \infty} \sqrt{7-x}$	4. Find $\lim_{x \rightarrow -\infty} \frac{x-3\sin x}{x}$